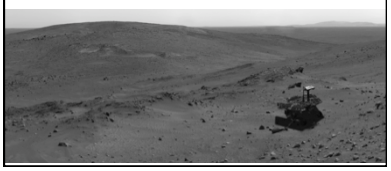
Mars Exploration Rover Mission

Dr. Barbara Cohen, Mission Science Team

NASA Marshall Space Flight Center



The Mars Exploration Rover Mission

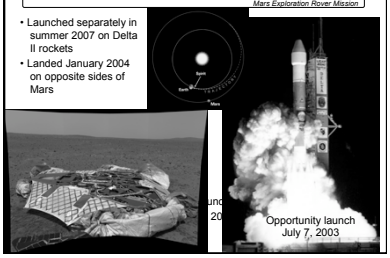
Mars Exploration Rover Mission

- ***Scientific goals***: search for and characterize a wide range of rocks and soils that hold clues to past water activity on Mars
- Part of NASA's Mars Exploration Program which includes three previous successful landers: the two Viking landers in 1976 and Pathfinder in 1997, and now Mars Phoenix in 2008
- Total cost of building, launching, landing and operating the rovers for the initial 90 sol -long primary mission: $820 million
- Both rovers still functioning over ***four years*** after landing!

Mission timeline

Mars Exploration Rover Mission

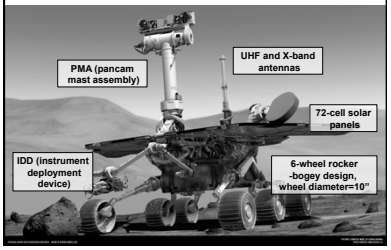
- Launched separately in summer 2007 on Delta II rockets
- Landed January 2004 on opposite sides of Mars



Opportunity launch
July 7, 2003

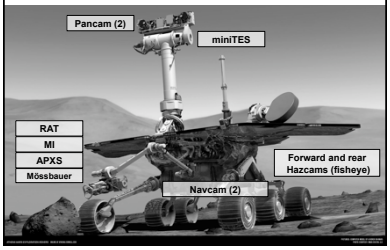
Rover design

Mars Exploration Rover Mission



Athena science payload

Mars Exploration Rover Mission



Opportunity: Eagle Crater

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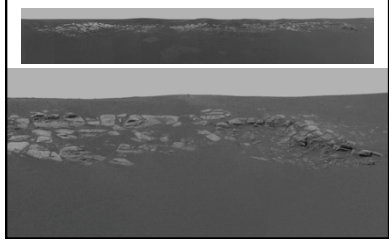
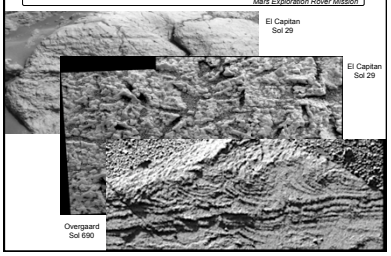
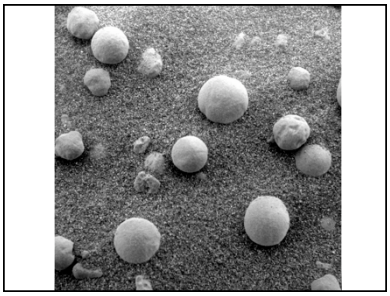
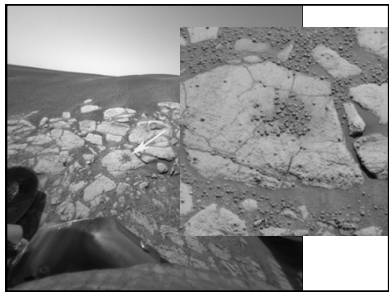


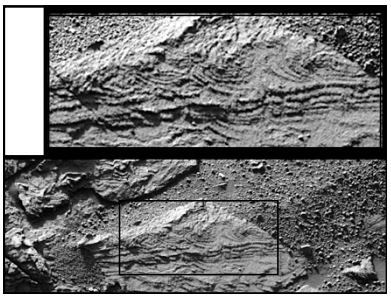
Opportunity: Mission Success

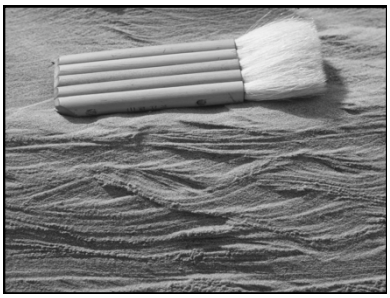
Mars Exploration Rover Mission

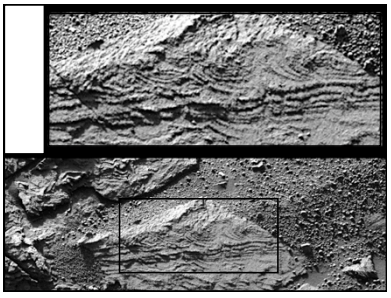










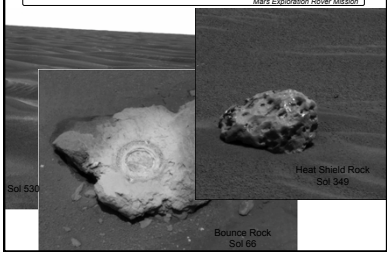


Farewell to Eagle Crater

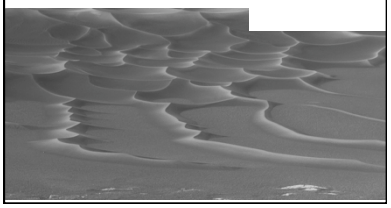
Mars Exploration Rover Mission

Meridiani Rocks: Grab bag

Mars Exploration Rover Mission



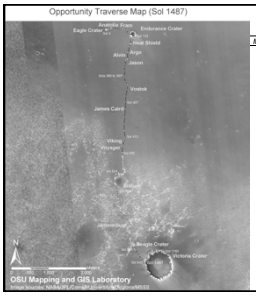
Meridiani sand

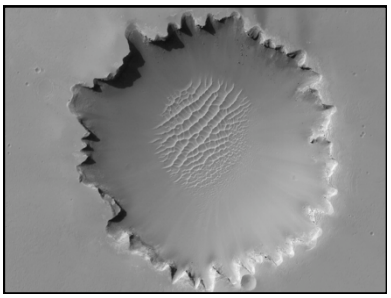


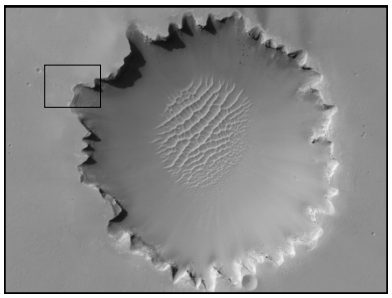
Meridiani sky

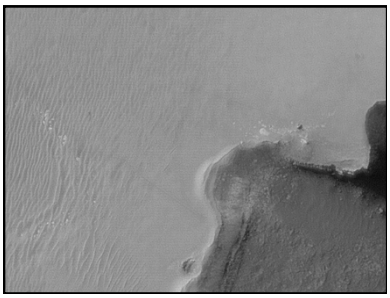
Opportunity Traverse Map (Sol 1487)

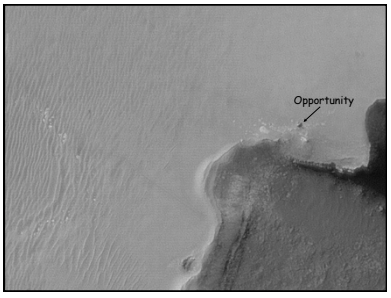
Mars Exploration Rover Mission

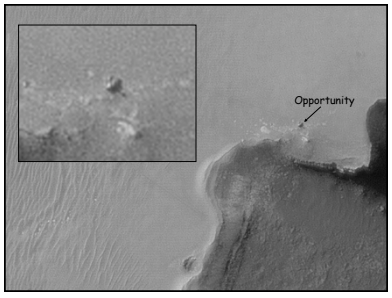









Opportunity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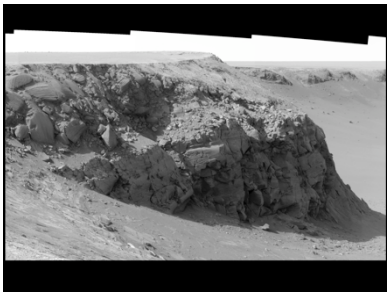
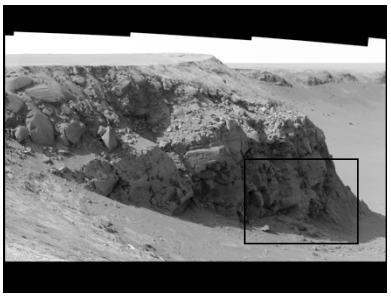
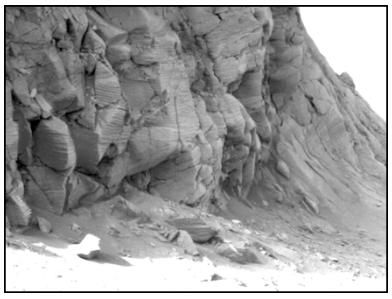
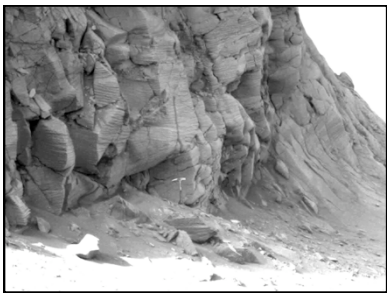


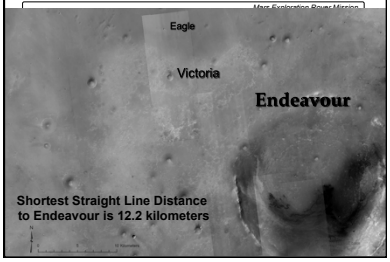






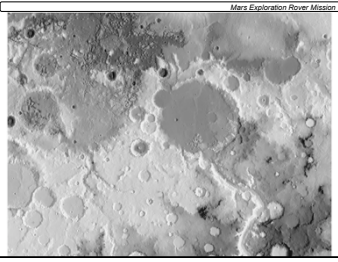
Where next?

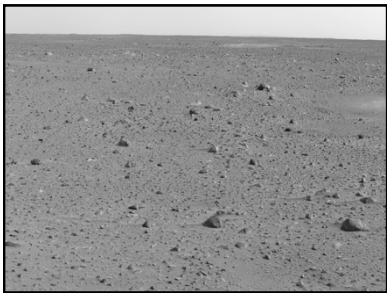
Mars Exploration Rover Mission



Spirit: Gusev Crater

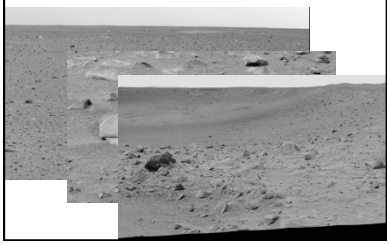
Mars Exploration Rover Mission



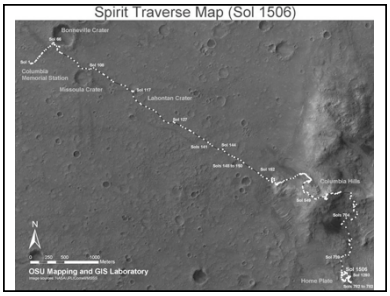


Gusev volcanic plains

Mars Exploration Rover Mission

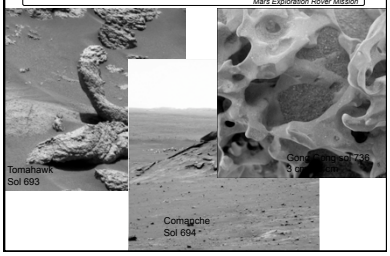


Spirit Traverse Map (Sol 1506)



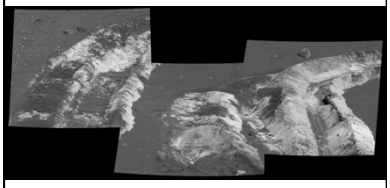
Gusev rocks: Volcanic

Mars Exploration Rover Mission



Sulfur & silica serendipity

Mars Exploration Rover Mission



Sulfur & silica serendipity

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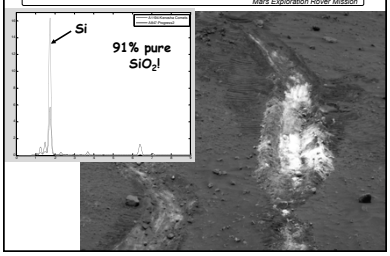
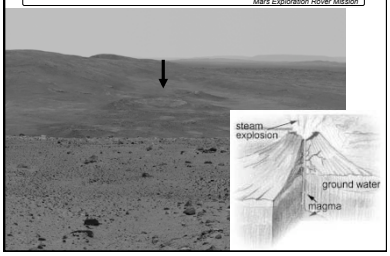


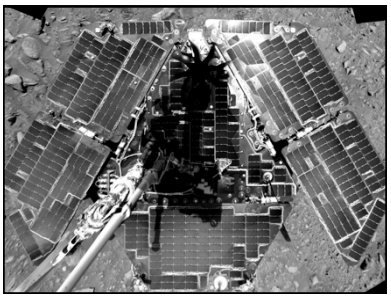
Home Plate

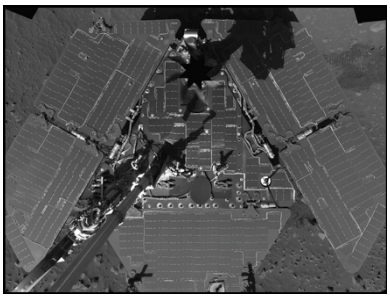
Mars Exploration Rover Mission



Wind and dust

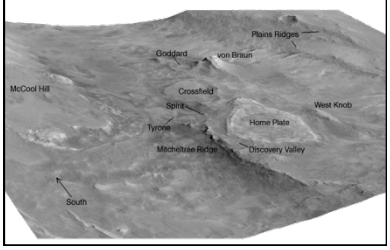
Mars Exploration Rover Mission

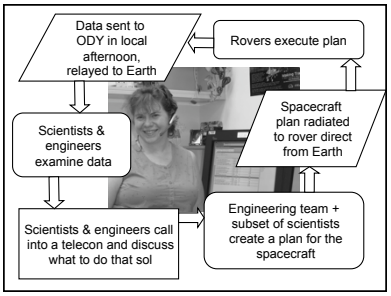




Where next for Spirit?

Mars Exploration Rover Mission



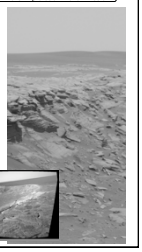


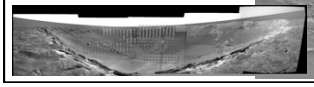
The Mars Exploration Rovers:
Still exploring
Still discovering
Still going….

Mast-mounted instruments

Mars Exploration Rover Mission

- Panoramic Camera (Pancam), for determining the mineralogy, texture, and structure of the local terrain
- Miniature Thermal Emission Spectrometer (Mini-TES) for identifying promising rocks and soils for closer examination
- Both are mounted 1.5 m high
- One motor turns the mast 360°; a separate elevation motor points the cameras 90° above and below the horizon





Arm-mounted instruments

Mars Exploration Rover Mission

- Mössbauer spectrometer (MB) for mineralogy of iron -bearing rocks and soils
- Alpha particle X-Ray Spectrometer (APXS) for abundances of elements in rocks and soils
- Magnets, for collecting magnetic dust particles
- Microscopic Imager (MI) for close-up, high-resolution images
- Rock Abrasion Tool (RAT), for removing dusty and weathered rock surfaces and exposing fresh material